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ADDITIONAL SPECIES OF FLORIDA ANTS, WITH REMARKS

By M. R. SMITH
Agent, U. S. Bureau of Entomology

In a previous article (Fla. Ent., Vol. 14, No. 1, pp. 1-7, 1930) I listed 76 species of ants for Florida. Since the appearance of my paper Dr. Wheeler has published a similar list (Jour. N. Y. Ent. Soc., Vol. 45, pp. 1-17, 1932) in which he recorded 91 species for the state, quite a number of which are new to science.

Another paper on the subject would hardly seem warranted at this time were it not for the fact that I have recently seen an unusually large collection of ants from the state. These ants were collected by Mr. D. E. Read during the early part of 1932 when he was engaged in scouting for Argentine ants in Florida under the direction of the United States Bureau of Entomology. As a result of Mr. Read's work I am able to add 13 species to the state lists formerly published by Dr. Wheeler and myself. In order to make my papers on the ants of the state complete, I am listing here not only the species collected by Mr. Read, but also those recorded by Dr. Wheeler which were not mentioned in my previous article. This will bring the number of species known to occur in the state up to 107. One should not conclude, however, that all of the species occurring in Florida have even yet been listed. Mississippi, a state in which the possibilities for collecting ants are hardly as good as those for Florida, has 135 species recorded to date; therefore one would expect the Florida list not only to equal but even to exceed this record. Since practically all of Mr. Read's collecting was done in towns where he was scouting for Argentine ants, he had little opportunity to collect those rather rare species which inhabit woodlands, rural areas, et cetera.

I am glad to state here that my assumption as to the presence of *Eciton (Acamatus) schmitti* Emery in Florida has been borne

out by Mr. Read's collecting. He found this ant at 3 different places in the state: namely, Sanford, Green Cove Springs, and Woodville. He was also fortunate enough to find another species, *Eciton (A.) carolinensis* Emery.

At Key West, Everglades, and St. Augustine Mr. Read found *Pheidole megacephala* Fab., an imported species which was not previously known to occur in the state. The specimens collected at these places have been compared with specimens given me by Doctors Wheeler and G. C. Aguayo and I have been unable to detect any distinct differences.

It is hoped that the papers on the ant fauna of Florida which have been published to date will be an incentive to others to work up an adequate knowledge of the ant fauna of the state.

Family FORMICIDAE

Subfamily PONERINAE

77. **Ponera ergatandria** Forel.

Belle Glade, Daytona Beach (D. E. Read).

So far as I am aware, this interesting species has been recorded from but one other state besides Florida, namely, Texas. As the specific name suggests, these ants have peculiar ergatoid forms. For a description of all castes see Wheeler, "Ants of Texas, New Mexico and Arizona," Bull. Amer. Mus. Nat. Hist., Vol. 24, pp. 405-406, 1908.

Subfamily DORYLINAE

78. **Eciton (Acamatus) carolinensis** Emery.

Madison (D. E. Read).

This species of legionary ant ranges through the Gulf and Southeastern states from Mississippi to North Carolina, at least. The type locality is North Carolina. The species is described by Emery in the Zool. Jahrb., Vol. 8, pp. 259-260, 1895.

On April 4, 1932, Mr. D. E. Read found male and female pupae of this species beneath a piece of paper lying on the ground. He stated that when disturbed, workers tried to carry the queen away but were more burdensome than helpful.

Subfamily MYRMICINAE

79. **Aphaenogaster (Attomyrma) texana** var. **silvestrii Menozzi.**

Gainesville (F. Silvestri), type locality.

Wheeler is of the opinion that this ant is scarcely distinct from *Aphaenogaster texana* var. *furvescens*, which is also known to occur in Florida. For a description of the species see Menozzi, Bull. Lab. of Gen. and Agr. Zool. (Portici, Italy), Vol. 22, pp. 282-284, 1929.

80. **Aphaenogaster (Attomyrma) texana** var. **miamiana** Wheeler.

Miami (A. E. Wight), type locality; Paradise Key, Planter (W. M. Wheeler); Biscayne Bay (Mrs. A. T. Slosson).

See Wheeler, "A List of The Ants of Florida With Descriptions of New Forms," Jour. N. Y. Ent. Soc., Vol. XL, pp. 5-6, 1932.

81. **Aphaenogaster (Attomyrma) texana** subsp. **nana** Wheeler.

Gainesville (W. M. Wheeler) type locality.

See Wheeler, Jour. N. Y. Ent. Soc., Vol. XL, p. 6, 1932.

82. **Pheidole anastasii** Emery.

Sanford, Lake Worth (J. Schmitt); Dunedin (W. S. Blatchley).

This species, which was originally described from Costa Rica, is recorded here for Florida on the basis of information secured from Dr. Wheeler. I have seen the same species in greenhouses in the District of Columbia, New Jersey, and Illinois.

83. **Pheidole megacephala** Fabr.

Everglades, Key West, St. Augustine (D. E. Read).

Wheeler records this imported species for Florida in his book entitled "Ants," but fails to list it in his recent paper on the ants of that state. Specimens collected at the localities referred to above have been carefully compared with supposedly authentic specimens of *megacephala*, and I have been unable to detect any distinct differences.

84. **Solenopsis xyloni** McCook.

Century, Gonzales (D. E. Read).

This species, which is the most common fire ant in the Gulf States, seems to be replaced in Florida by *Solenopsis geminata* and its sub-species *rufa*. The localities mentioned above are in the northwestern part of the state. It is one of the most important economic species in the United States.

85. **Solenopsis (Euopthalma) globularia** subsp. **littoralis** Creighton.

Englewood, Jensen, Daytona Beach, Jacksonville, Perry (D. E. Read).

This interesting species was originally described from specimens taken at Mobile, Alabama. See Creighton, "New World Species of the Genus Solenopsis," Proc. Amer. Acad. Arts and Sci., Vol. 66, pp. 113-114, 1930. I have seen specimens also from Mississippi, Georgia, and South Carolina. Apparently the ants are confined to the coastal sections of these states.

86. **Monomorium destructor** Jerdon.

St. Petersburg, Bradenton, Callahan (D. E. Read).

This introduced species is recorded for the first time from Florida, so far as I am aware. Like all of the other forms of *Monomorium* in the state, the ants are of economic importance.

87. **Tetramorium simillimum** F. Smith.

Fort Ogden, Pompano, Lake Worth, Palmdale, Okeechobee, Sebastian, Winter Garden, Sanford, Jacksonville (D. E. Read).

Another imported species, which is also of economic importance. This ant does not seem to have as wide a distribution in the state as *Tetramorium guineense.*

88. **Tetramorium (Triglyphothrix) striatidens** Emery.

Marianna, Chipley (D. E. Read).

This imported species was first recorded for the United States by Wheeler on the basis of specimens taken at New Orleans, Louisiana by E. R. Barber. For an account of this see Wheeler, Jour. Econ. Ent., Vol. 9, pp. 566-569, 1916. During the past year I have seen specimens from Mississippi, Alabama, and South Carolina.

89. **Strumigenys (Strumigenys) louisianae** Roger.

Blountstown (D. E. Read).

This interesting species undoubtedly has a wider distribution in Florida than the above record indicates. For description of the ant and an account of its biology see Smith, "A Revision of the Genus Strumigenys of America North of Mexico, Based on a Study of the Workers," Ann. Ent. Soc. Amer., Vol. 34, pp. 689-690, 1931.

90. **Leptothorax fortinodis** Mayr.

Millville (D. E. Read).

A native species with a wide distribution over the southern and eastern sections of the United States. For a description of the species see Wheeler, "A Revision of the North American Ants of the Genus Leptothorax," Proc. Acad. Nat. Sci. Phila., pp. 233-235, 1903.

91. **Macromischa (Antillaemyrmex) floridanus** Wheeler.

Paradise Key (W. M. Wheeler) type locality.

This interesting species was recently described by Wheeler on page 27 of his paper entitled, "Ants of the Genera *Macromischa, Croesomyrmex,* and *Antillaemyrmex,*" Bull. Mus. Comp. Zool., Vol. LXXII, 1931.

92. **Cardiocondyla wroughtoni** var. **bimaculata** Wheeler.

Royal Palm Park, (W. M. Wheeler); Winter Garden (D. E. Read).

Originally described from Formosa by Wheeler. Very probably introduced into the state within recent years. Wheeler found it nesting in the culms of sedges.

93. **Cardiocondyla nuda** var. **minutior** Forel.

Miami (W. E. Wight); Miami, Hollywood, Sebring, (D. E. Read).

Originally described from Hawaii by Forel. Also probably introduced into Florida in recent years.

94. **Xenomyrmex stolli** subsp. **rufescens** Wheeler.

Long Pine Key (W. M. Wheeler) type locality.

Recently described by Wheeler in his paper entitled, "Neotropical Ants of the Genus Xenomyrmex," Rev. de Entomologia, Vol. 1, p. 137, 1931.

95. **Cremastogaster (Acrocoelia) ashmeadi** var. **matura** Wheeler.

Miami, type locality; Cocoplum Beach, Paradise Key (W. M. Wheeler).

For a description of this species see Jour. N. Y. Ent. Soc., Vol. XL, p. 8, 1932.

96. **Cremastogaster (Acrocoelia) atkinsoni** var. **helveola** Wheeler.

Lake Worth (J. Schmitt) type locality.

For a description of this species see Wheeler, "A New Paper Making Crematogaster," Psyche, Vol. 26, pp. 109-110, 1919.

97. **Cremastogaster (Acrocoelia) lineolata** subsp. **pilosa** Emery.

Dunedin (W. S. Blatchely).

Subfamily DOLICHODERINAE

98. **Iridomyrmex humilis** Mayr.

Pensacola, Jacksonville, Caryville, Palatka (D. E. Read); Gonzalez (P. F. Robertson).

In his paper on ants of Florida, Wheeler lists the Argentine ant from Gainesville on the basis of a single specimen collected there in October 1914 (collector's name not cited). Mr. Read, who scouted the town on January 5, 1932, was unable to find the species there. Entomologists at the University of Florida also have no knowledge of the presence of the ant in Gainesville. The infestation at Gonzalez is now believed to have been exterminated. The other infestations in the state are of no great magnitude as yet.

99. **Dolichoderus (Hypoclinea) plagiatus pustulatus** var. **beutenmuelleri** Wheeler.

Pablo Beach (P. Laurent).

This is very probably the species which I recorded from Royal Palm Park in my former paper as a variety of *pustulatus*.

Subfamily FORMICINAE

100. **Brachymyrmex heeri** var. **obscurior** Forel.

Stuart (D. E. Read).

This species was probably introduced from Cuba or the Bahamas. It was found by Mr. Read in the vicinity of the docks at Stuart.

101. **Camponotus herculeanus** subsp. **pennsylvanicus** DeGeer.
Tallahassee (L. S. Barber); Madison, Chipley, Westville (D. E. Read).

The carpenter ant is apparently confined to the more northern section of the state. Wherever it occurs, though, the ant can be regarded as a potential house pest.

102. **Camponotus (Tanaemyrmex) incensus** Wheeler.
Pigeon Key, near Miami (W. M. Wheeler) type locality.

A species which closely resembles *C. tortuganus*, yet is distinct from this ant in size, structure, and other characters. See Wheeler's description in the Jour. N. Y. Ent. Soc., Vol. XL, p. 14, 1932.

103. **Camponotus (Tanaemyrmex) socius** var. **osceola** Wheeler.
Jacksonville (Van Duzee Coll.) type locality.

A color variety of *Camponotus socius*. The latter is known to occur as far north in the United States as Southern Pines, North Carolina, and as far west as Waynesboro, Mississippi. For a description of this variety see page 15 of the same publication as the one referred to above.

104. **Camponotus (Myrmentoma) caryae discolor** var. **cnemidatus** Emery.
Madison (D. E. Read).

This species is recorded here on the basis of a tentative determination. I have also seen specimens similar to these from Mississippi and Indiana. Mr. Read found the ants foraging on the trunk of an oak tree.

105. **Prenolepis imparis** var. **testacea** Emery.
St. Augustine (C. T. Brues); Tallahassee.

A color variety of the species, which is rather common in the Southern States.

106. **Formica (Neoformica) pallide-fulva** Latr.
St. Petersburg, Gainesville.

Recorded by Wheeler in his recent list of the ants of the state.

107. **Lasius (Cthonolasius) umbratus mixtus** var. **aphidicola** Walsh.
Tallahassee (D. E. Read).

This species is very probably confined to the northern section of the state. The ants are noted for their relationship with subterranean forms of plant lice and mealy bugs.

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FOOD HABITS OF *LEIS CONFORMIS* BOISD. (CHINESE LADYBEETLE)

By J. R. WATSON and W. L. THOMPSON*

In June, 1925, the senior author secured a colony of *Leis conformis* from the California Agricultural Experiment Station for the purpose of establishing them in Florida to combat *Aphis spiraecola* Patch (green citrus aphid).

FOOD HABITS IN THE INSECTARY

The adults and larvae thrived on a number of different species, but *Aphis spiraecola* and *Rhopalosiphum pseudobrassicae* were used to a large extent in rearing the beetles, for they appeared to do equally well on either of them. *Aphis gossypii, Brevicoryne brassicae,* and *Myzus persicae,* were used less, but the beetles devoured them seemingly as fast as they did the *Aphis spiraecola* or *R. pseudobrassicae.* The adults, as well as the larvae, have been observed eating the pupae and eggs of their own kind, and also those of other ladybeetles. The larvae especially are of a cannibalistic nature, as they attack the smaller larvae, and in many cases, larvae of their own size, even though a fair number of aphids may be available. Besides feeding on the previously named aphids, the larvae feed on several kinds of small, soft-bodied larvae, such as those of the syrphus fly, mealy-bugs, small cabbage loopers, and other species of ladybeetle larvae.

*Contribution from the Department of Entomology, Agricultural Experiment Station.

OBSERVATIONS OF FOOD HABITS IN THE FIELD

During the spring and summer of 1926, between forty and fifty colonies of these beetles were liberated in orange and tangerine groves in different sections of the citrus belt. Up to the beginning of the present year, there is only one general locality in which these beetles are known to have become established; namely, at Doctor Phillips Station, and the vicinity of Windermere, in Orange County. The above named places take in a radius of about five miles.

On April 22, 1932, the junior author visited some groves in the vicinity mentioned above, and along the edge of one grove, large numbers of *Leis* were observed apparently feeding on the extra floral nectaries at the base of the flowers of *Crotalaria striata.* Since the Crotalaria had not been killed during the winter, a number of blooms were present. On June 16, another visit was made to the same grove, and again the beetles were found on the Crotalaria blooms, but in much larger numbers than in April. Aphids were very scarce on the citrus trees. On February 2, 1933, a few beetles were observed on the Crotalaria, but very few blooms were present. In April, 1933 the writers visited this locality and the following interesting facts were observed: Aphids were hard to find on the orange and tangerine trees, but many young adult beetles that had recently emerged were present on the trees. A few beetles were on the Crotalaria, but blooms were not plentiful. In one grove, the crab grass was infested with *Aphis maidis* Fitch* and many adult beetles were feeding on them. In a wood adjacent to this grove, the saw palmettoes, *Serenoa serrulata,* were in full bloom and large numbers of young adult beetles were feeding on the pollen of these flowers. Beetles were on the palmettoes three to four hundred yards from the grove. The beetles were also found feeding on the very tender terminal buds of scrub oak. Gum was oozing from wounds of the terminal bud which apparently had been made by the beetles themselves. In May the groves were again visited by the authors. The beetles were found in abundance feeding on the sap from wounds resulting from a severe pruning of tangerine trees. As many as 30 beetles were found collected around one wound. During the previous year they had been observed feeding on gum exuding from wounds on the trunk of these citrus trees. At this time they

*Identified by Dr. A. N. Tissot.

were more abundant on the blossom of Crotalaria and were also found feeding on the blossoms of fire weed, *Erechtites hieracifolia* (L) Raf. They had eaten off the entire tops of the blossoms of these plants including pistils and stamens. On none of these plants, however, were any larvae, pupa or eggs observed.

In July, 1933 W. W. Yothers and R. L. Miller of the Orlando Laboratory of the Bureau of Entomology, U. S. D. A., observed them feeding on *Trialeurodes variabilis* on papaya. Not only adults but larvae were present on the leaves of the papaya. In August the senior author, together with Mr. Yothers and Dr. Miller again visited the papaya plantation at Orlando. In addition to numerous adults many larvae were seen and several clusters of eggs and several pupae, showing that the beetles are able to breed upon this whitefly and do not use it as a food for adults only.

In April, 1933, the authors took 117 pupa off of one small tangerine tree less than 10 ft. tall. No native lady beetles have ever been observed to become as abundant as were these, and it was very evident that they had been an important factor in controlling aphids in these groves. Although no other control measures had been taken the amount of damage by the aphids was slight. It would seem that with the knowledge that we now have of the possible summer foods for this ladybeetle at a time when aphids are scarce, we are in a position to make it possible for growers to establish this beetle permanently in many groves in Florida and that it will be a very great help in controlling the citrus aphids.

INSECT PARASITES OF CITRUS IN CENTRAL AMERICA

By MARSTON BATES

Museum of Comparative Zoology, Cambridge, Mass.

J.M.R.

The insect pests of Citrus anywhere on the American continent may be divided into three large groups: general feeders that number Citrus among their hosts; species that were originally parasites of *Xanthoxylum* or other indigenous Rutaceae, and that have adapted themselves to Citrus where it has been introduced; and Citrus feeding insects that have followed their host in its progress over the world. Many Citrus pests have become so widespread that it would be difficult now to determine their place of origin; others, mostly belonging to the second group, seem still to be of limited range. A thorough study of the Citrus

insects of the world might throw light on many obscure matters in insect distribution; might enable us to place quarantines and control measures on a more rational basis. Certainly a list of the Citrus insects of any one region is always of interest to those who are working on similar forms in other parts of the world.

The work on which this paper is based was done while the writer was in the employ of the United Fruit Company, and he is very much indebted to the officials of that company, especially Dr. Wilson Popenoe, for many favors and courtesies. Insect collections were made in Guatemala, Honduras and El Salvador. Climatic conditions in this region are exceedingly varied, including tropical, sub-tropical and temperate types. The Honduras coast, where much of the collecting was done, is very tropical, with a rainfall of 100 to 175 inches annually. The highlands of Guatemala, on the other hand, are in general temperate, and the rainfall may be no more than 30 inches annually.

At least four genera of Rutaceae are indigenous in this region: *Casimoroa, Peltostigma, Pilocarpus* and *Xanthoxylum.* Insects were collected from none of these except *Casimiroa,* the fruits of which were found to be infested with *Anastrepha ludens.*

Citrus fruits were introduced into Central America by the Spaniards soon after the conquest, and have become pretty well naturalized in many places. They are distributed everywhere from sea level to well above the frost line, becoming rare above 6000 ft. In most places they are grown only as door-yard trees: a significant factor in a study of their pests, as it means that there are no large stands of food material, that individual plants are generally separated from others of their kind by unrelated growth. In the few commercial orchards that I have seen in the region there were no signs of unusual insect activity.

There has been no real restraint upon the free movement of Citrus products from other parts of the world into Central America, or between the countries themselves; but such traffic is rare, almost confined to the occasional introduction of nursery stock from California. Certain scale insects have probably been introduced by this means; but the value of the improved stock probably over-balances the potential danger of insect introduction by this means.

Within the countries themselves the movement of Citrus fruits is rather wide, as they are often marketed at considerable distances from their place of origin. It would be difficult to say how much this has affected insect distribution; I cannot see that

there is any correlation between trade routes and fruit fly distribution.

ORTHOPTERA

Schistocerca paranensis Burm.

This is the migratory locust of tropical America: a general and ubiquitous pest. Citrus is one of its favorite food-plants.

THYSANOPTERA

Frankliniella insularis Franklin (det. J. R. Watson)

Sometimes common in blossoms; generally distributed.

ISOPTERA

Nasutitermes cornigera Motsch (det. T. E. Snyder)

Prof. T. H. Hubbell found the nest and galleries of this species in an old Citrus tree at Puerto Castilla, apparently doing considerable injury. Such cases are not uncommon, but it is difficult to show that the termites attack trees that are not already weakened from some other cause.

HEMIPTERA

Several species of leaf-hoppers and bugs were found on Citrus, but as they were local species, apparently rare or accidental on Citrus, there is no object in enumerating them here.

(Aphididae)

One or more species of *Aphis* were abundant on the young plantings about Tela, Honduras, but Mr. Mason has found it impossible to determine them beyond the genus with the material at hand.

Myzus persicae Sulz. (det. P. W. Mason)

On citrus in Guatemala City; possibly more widely distributed.

Toxoptera aurantii (Boyer) (det. P. W. Mason)

This is the common Citrus aphis of the Pacific coast of Guatemala and El Salvador, occurring at least up to 5000 ft., the lower limit of the temperate zone. It was not collected on the Carribbean coast, but may very well occur there.

(Aleyrodidae)

Although white-flies were noticed about Citrus trees at various times, they were never seen in any abundance, and none were collected from this host. It is notable, however, that Baker (1923) has described a Citrus feeding species from Honduras, *Aleurodicus manni.*

(Coccidae)

Ceroplastes floridensis Comstock

This species was found rarely in the United Fruit Company's Citrus grove, near Tela, Honduras.

Icerya montserratensis R. & H. (det. H. Morrison)

Occasional specimens of this species were also found in the groves on the Honduras coast.

Icerya purchasi Maskell (det. G. B. Merrill)

This wide-spread insect was found only in the highland cities of Guatemala: in Quezaltenango (8000 ft.), Huehuetenango (6000 ft.), and Guatemala City (5000 ft.). It is probably of recent introduction, and has not yet spread beyond the gardens of these cities, where it is common on various ornamental plants.

Lepidosaphes beckii New. (det. G. B. Merrill)

A rather common insect on Citrus, especially in the subtropical parts of Guatemala. Unfortunately scales of this type were usually collected in only a few localities, so that their exact distribution cannot be given.

Lepidosaphes gloverii Pack. (det. H. Morrison)

In the Citrus groves on the Honduras coast.

Parlatoria pergandei Comst. (det. Morrison, Merrill)

Apparently generally distributed, as it was collected both on the tropical Caribbean coast and on the subtropical Pacific slope.

Pseudaonidia (Selenaspidus) articulatus Morg. (det. H. Morrison)

On the Honduras coast.

Pseudococcus citri Risso (det. G. B. Merrill)

This insect is sometimes a severe pest of coffee in parts of the Pacific slope of Guatemala, especially in the cloud zone, between 4000 ft. and 5000 ft. in elevation. It and other mealybugs were observed from time to time on Citrus, but only as occasional specimens, never as pests.

Saissetia hemisphaerica Targ. (det. Morrison)

This scale seems to be universally distributed in the region, from the tropical coast well into the temperate zone. It was collected from Citrus in various localities, but not noted especially as a pest. It is sometimes very abundant on young coffee plants.

Toumeyella sp. (det. U. S. Bur. Ent.)

Reported from *Citrus aurantifolia* in El Salvador by Dr. Calderon.

(To be continued)

V-45

TWO NEW SPECIES OF PLECTROTHRIPS

(Continued from Vol. XVII, No. 1, p. 18)

Antennae 8-segmented, 2.3 times as long as head. Segment 1 concolorous with the head; 2 lighter, especially apically; 3 yellow in basal .4, blackish brown apically; 4 dark brown lighter apically; 5 and 6 brownish yellow; 7 and 8 blackish brown. In lighter individuals the whole antenna, except the basal .4 of segment 3, which is almost colorless, is brownish yellow concolorous with the head. Segment one large, oblong; segment 2 narrow; 3-5 club-shaped; 6 and 7 oblong ovoid; 8 contracted to a broad pedicel, narrow in dorsal view, oblong oval with serrated margins in side view.

Prothorax somewhat shorter than the head but (including coxae) nearly twice as wide. At each posterior angle are two pointed, pale yellow bristles which are over half as long as the prothorax, also four minute ones. Near the median line on the posterior border is a pair of small bristles. At each anterior angle is a single bristle about a third as long as those at the posterior angles; along the anterior margin four minute ones. Midway of each lateral border is a bristle nearly as long as those at posterior angles. A similar bristle on each coxa.

Pterothorax slightly broader than the prothorax. Wings short, membrane usually reaching only the sixth abdominal segment, broad, not narrowed in middle, lightly shaded with yellow; fore pair with 13-18 interlocated bristles on posterior margin. Legs slender, concolorous with the body except the fore tibiae and tarsi and sometimes the fore femora which are lighter. Fore tibiae with a rather large blunt, oblong anteriorly-directed-tooth on the inner margin at the apex. Tarsal tooth, heavy, long and slightly curved.

Abdomen long and heavy, gradually narrowed posteriorly. Bristles on segment 9 hardly as long as the tube. Tube nearly as long as the head, sides straight, terminal bristles much shorter than the tube.

Measurements: (Average of 10 macropterous females). Body length 2.7 mm. (from 2.5 to 3.00 mm.) Head, length .27 mm., width .26 mm.; prothorax, length .22 mm., width (including coxae) .45 mm.; pterothorax, width .52 mm.; abdomen, width .55 mm., tube, length .25 mm., width at base .096 mm., at apex .045 mm.

Antennal segments, length (breadth), I, 71.6 (51); II, 73.5 (36.7); III, 109 (42); IV, 101 (42.5); V, 87 (36); VI, 80 (30); VII, 66 (26); VIII, 64.5 (20). Total length .62 mm.

Micropterous female. Similar to macropterous female but wings reaching only abdominal segment 2.

Apterous female. Wings and ocelli entirely absent. Eyes very small.

Male. Similar to apterous female, but smaller.

Measurements: (Average of two males).

Body length 2 mm. (1.8 and 2.17 mm.). Head, length .225, width .23; prothorax, length .23, width .425; pterothorax, width, .44; abdomen, width .46; tube, length .20; width at base .09, at apex, .039 mm. Antennal segments, length (breadth), I, 64 (45); II, 64 (34); III, 90 (35); IV, 82 (35); V, 74 (32); VI, 68 (27); VII, 55 (24); VIII, 58 (17) microns. Total length .50 mm.

Nymph. Grayish brown by reflected light with much bright scarlet hypodermal pigment. Antenna 7-segmented.

Described from fourteen macropterous, one micropterous, seven apterous females, two males and two nymphs. Collected by Prof. S. C. Bruner beneath the bark of poles used as supports for lima beans at El Cano, Cuba, Oct. 23, 1931.

NOTES ON ROCKY MOUNTAIN PIPUNCULIDAE (DIPTERA)

By GEORGE F. KNOWLTON
Utah Agricultural Experiment Station

The larvae of this family are adapted to a life of internal parasitism, while the extremely active adults are well fitted to capture and oviposit in small, active insects. The adult specimens herein recorded were collected in connection with beet leafhopper investigations. The writer is indebted to Mr. C. T. Greene for the identifications.

Pipunculus unguiculatus Cress. This species was collected at Cedar Valley, Curlew, Ellerbeck, Garfield, Garland, Grantsville, Hansel Valley, Kelton, Magna, Orr's Ranch, Promontory, Skull Valley, Snowville, Timpie, and Wasatch, in Utah (Knowlton:: Janes).

Pipunculus subnitens Cress. Collected at Black Rock, Curlew, Delle, Deweyville, Grantsville, Hansel Valley, Hunter, Ironton, Kelton, Low, Promontory, and Timpie, in Utah (Knowlton:: Janes).

Pipunculus horvathi Kertesz. Magna, Utah, August 14, 1931 (Knowlton).

Pipunculus dubius Cress. On sugar beets at Bothwell, Utah, August 8, 1932 (Knowlton).

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NON-POISONOUS

DEATH TO INSECTS

WILL KILL

Mexican Bean Beetle, Bean Leaf Roller, Leaf Hoppers, Ants, Aphis, Fern Caterpillar and many other insects.

Will **Not**—STAIN, DISCOLOR, nor BURN

HARMLESS TO MAN, PETS OR BIRDS

PACKED in 1 oz. Bottles, ½ pt. Tins, 1 qt. Tins, 1 gal. Tins

McCORMICK & CO.

Manufacturing Chemists

BALTIMORE, MD., U.S.A.

KALO

NON - ARSENICAL INSECTICIDES
FOR SAFER, BETTER RESULTS

KALITE The quick-killing dust, ready to use, for most chewing insects, such as beetles and worms, contains a special prepared fluosilicate which gives dependable insect toxicity, exceptional plant tolerance, covering and adhesive qualities, with economy.

KALO SPRAY (Kaolith) The only sodium fluoaluminate specially prepared for insecticide purposes. Used as a wet spray to replace arsenic for most purposes on fruits and vegetables, or for home-mixed dusts. Contains no sodium sulphate or uncombined sodium or aluminum fluorides.

BOTH KALITE AND KALO SPRAY ELIMINATE ARSENICAL RESIDUE

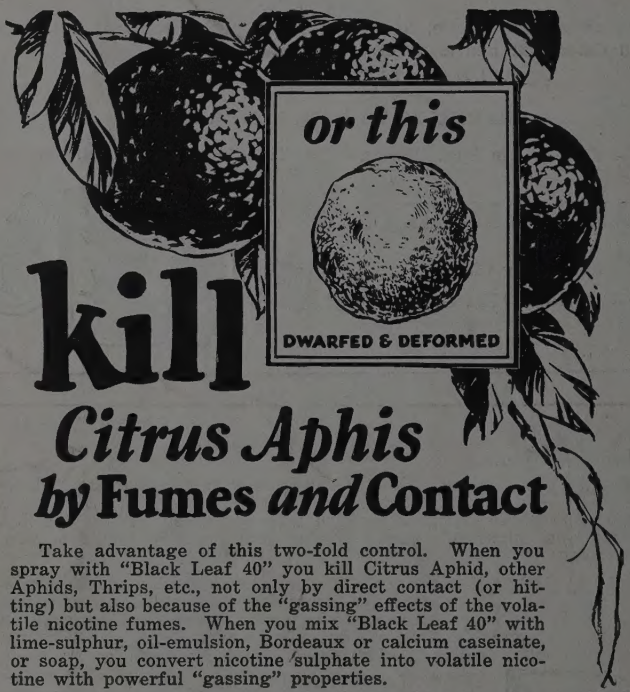
KALOIL Self spreading free flowing energized pyrethrum spray. Needs no soap, and contains none. Mixes readily with any water. Economical for commercial use.

THE KALO COMPANY
Quincy, Illinois

We recommend the goods advertised in The Florida Entomologist. Please mention Entomologist when you write our advertisers.

USE "BLACK LEAF 40"

It Gives You Extra Insurance Against Aphis.



kill *Citrus Aphis* *by* Fumes *and* Contact

Take advantage of this two-fold control. When you spray with "Black Leaf 40" you kill Citrus Aphid, other Aphids, Thrips, etc., not only by direct contact (or hitting) but also because of the "gassing" effects of the volatile nicotine fumes. When you mix "Black Leaf 40" with lime-sulphur, oil-emulsion, Bordeaux or calcium caseinate, or soap, you convert nicotine sulphate into volatile nicotine with powerful "gassing" properties.

Likewise, when you dust with Nicotine Dust, insects are killed by actual contact of the dust with their bodies and also by the powerful nicotine gas.

"ASK YOUR EXPERIMENT STATION"

TOBACCO BY-PRODUCTS & CHEMICAL CORP.

LOUISVILLE, KENTUCKY
(Incorporated)

Kills Aphis

"Black Leaf 40"
40% Nicotine